

# The Mining Journal

## AND COMMERCIAL GAZETTE.

### SUPPLEMENT.

or of the Vice-Warden as judge of the said court, as shall be required to be sealed, shall be sealed therewith.

XX. And be it further enacted, that all barristers at law and all attorneys and solicitors of any of the superior courts of law or equity at Westminster may appear and plead in any proceedings in the said court of the Vice-Warden; and in case any person not being an attorney or solicitor of such superior courts shall practice in the said court of the Vice-Warden as attorney or solicitor, he shall be deemed guilty of a contempt of the said court, and be liable to all the penalties incident thereto, on complaint thereof made to the said court, and that all the laws and statutes now in force concerning attorneys or solicitors shall, so far as the same are applicable, extend to attorneys or solicitors practising in the said court of the said Vice-Warden.

XXI. And be it further enacted, that the court of the Vice-Warden shall have jurisdiction throughout the county of Cornwall, and be held at Truro in the said county, and shall be a court of record, and shall have within the limits of its jurisdiction all the powers, rights, privileges, and incidents of a court of record as fully and amply to all intents and purposes as the same are used or exercised or enjoyed by any of his Majesty's courts of law at Westminster; and that the Vice-Warden for the time being shall have, use, exercise, and enjoy all the powers, rights, privileges, and exemptions of a court of record; and that the sitting of the said court shall be held as often as shall be found necessary, and at least once in every three calendar months, on such days as the Vice-Warden shall from time to time appoint.

XXII. And be it further enacted, that it shall and may be lawful for the Duke of Cornwall for the time being, or for his Majesty, his heirs and successors, King or Queen Regnant of England for the time being, in case there shall be no Duke of Cornwall, or the Duke of Cornwall for the time being shall be under age, by letters patent under the Privy Seal of the Duchy of Cornwall or under the Great Seal of England, as the case may be, from time to time to appoint a fit and proper person, being a barrister-at-law or a solicitor or attorney of one of the superior courts at Westminster, to be and act as the Registrar of the said court of the Vice-Warden, and to attend upon and assist the said Vice-Warden in his said court, whether sitting as a court of law or equity, and to enter and draw up all orders, decrees, sentences, and judgments of all kinds made and pronounced by him, and to take such accounts and to execute such references as the said Vice-Warden shall direct, and that the person so appointed as Registrar shall hold his office during his good behaviour: provided always that it shall and may be lawful for the Duke of Cornwall for the time being, if of full age, or his Majesty, his heirs and successors, King or Queen Regnant of England for the time being, if there be no Duke of Cornwall, or if the Duke of Cornwall for the time being be under age, on a requisition to him for that purpose, stating therein sufficient grounds, and signed by the Vice-Warden for the time being and by five or more of the council or of the commissioners or of the principal officers of the Duchy, but not otherwise, to remove the person for the time being holding the said office of Registrar.

XXIII. Provided always, and be it enacted, that, notwithstanding any thing herein contained, the appointment to the office of such Registrar shall, during the time the present Lord-Warden of the Stannaries holds such situation of Lord-Warden, be in such Lord-Warden, subject nevertheless to all the provisions as to the qualification of the person appointed, and his removal, as hereinbefore contained.

XXIV. And be it further enacted, that it shall and may be lawful for the Vice-Warden for the time being to appoint by writing under the seal of his court a fit and proper person to be and act as his Secretary, and also in like manner to appoint one other fit and proper person to be and act as Prothonotary or Assistant Registrar in the said court, and also in like manner to appoint one other fit and proper person (who shall enter into such security as the Vice-Warden for the time being shall think fit) as Collector for the said court.

XXV. And whereas it is expedient that the Vice-Warden for the time being, and the Registrar, and the other before-mentioned officers of his court, should be paid by fixed salaries, and that all fees received by such Registrar and the other officers aforesaid for business done in the court should be accounted for in manner hereinafter-mentioned: and whereas his Majesty has been graciously pleased to direct that one moiety or half-part of the salaries of the Vice-Warden and of the before-mentioned officers of his court should be paid out of and be a charge upon the revenues of the Duchy, subject nevertheless to be in part indemnified by contribution of part of such fees so to be accounted for as aforesaid: and whereas it is expedient that for the purpose of raising money sufficient, with the remaining portion of such court fees, to pay the other moiety or half-part of the aforesaid salaries of the said Vice-Warden and the aforesaid officers of his court, a small assessment should be made on all metals and metallic minerals (except tin and ore) over all matters connected with which the jurisdiction of such court is hereby extended as aforesaid, and which shall be from time to time brought to sale in or withdrawn from any mine in the said county of Cornwall; be it therefore enacted, that there shall be paid and payable, in the manner hereinafter-mentioned, the yearly sums following as and for the salaries to the Vice-Warden and the before-mentioned officers of his said court for the time being: (videlicet) to the Vice-Warden the sum of one thousand five hundred pounds, to the Registrar the sum of five hundred pounds, to the person who shall be so appointed the Secretary to the Vice-Warden the sum of one hundred pounds, to the Prothonotary or Assistant Registrar the sum of two hundred pounds, and to the Collector the sum of thirty pounds; which said several sums shall be paid from time to time half-yearly, in manner hereby provided, free and clear from all taxes and deductions whatsoever, on the twenty-fifth day of March and on the twenty-ninth day of September in each year, by equal portions, the first of such respective portions to be paid on the twenty-fifth day of March next; and that if any person at any time holding any of the said offices shall die, resign, or be removed from the same, the executor or administrator of the person so dying, or the person so resigning or being removed, shall be entitled to have such proportionate part of his salary as shall have accrued during the time that such person shall have held his office since the last payment; and that the successor of any such person so dying, resigning, or being removed as aforesaid, shall be entitled to receive such portion of his salary as shall be accruing or shall accrue from the day of such death, resignation, or removal.

XXVI. And be it further enacted, that a moiety or half-part of the aforesaid salaries to the Vice-Warden for the time being, and to the aforesaid officers of his said court shall be a charge on the revenues of the Duchy of Cornwall, and that the same shall be paid by the Receiver-General for the time being of the said Duchy, under debentures for that purpose from the Auditor for the time being of the said Duchy, in which said Auditor is hereby authorised to issue; and that the said Receiver-General shall, on the twenty-fifth day of March and the twenty-ninth day of September in each year, under the debentures so issued, pay, free from all deductions, the sums following:—(videlicet) to the Vice-Warden for the time being the sum of three hundred and seventy-five pounds, to the Registrar the sum of one hundred and twenty-five pounds, to the person so appointed Secretary to the Vice-Warden the sum of twenty-five pounds, to the Prothonotary or Assistant Registrar the sum of fifty pounds, and to the Collector the sum of seven pounds ten shillings.

XXVII. And be it further enacted, that the person so as aforesaid appointed Secretary to the Vice-Warden, and the said Prothonotary or Deputy Registrar, and the said Collector, shall once in every half-year account for and pay over to the Registrar for the time being of such court all fees received by them by virtue of their respective appointments during the previous half-year; and that the Registrar for the time being shall forthwith make out a full and true account of all fees received by him during such preceding half-year, and of all fees received by the aforesaid officers of the said court, and accounted for and paid to him as aforesaid, for the same period; and that such Registrar shall have such account audited by the said Vice-Warden for the time being, in which account and audit there may and shall be charged and allowed such small sums of money as to the Vice-Warden shall seem reasonable for the keeping order in, and the lighting, firing, and cleansing the place in which such court shall be held, and shall transmit a copy of such account so audited to the Auditor for the time being of the said Duchy, and shall pay or cause to be paid to the said Receiver or his deputy one-third part of the total amount of fees so appearing to have come to the hands of such Registrar, for which sum so paid the Receiver shall on passing his accounts give credit to the Duchy in part discharge of the moiety of the salaries so as aforesaid charged on the revenues of the said Duchy.

XXVIII. And be it further enacted, that there shall be paid and payable the sum of one farthing in the pound sterling on the value of all metals and metallic minerals (except tin and ore) which shall be from time to time brought to sale in or withdrawn from any mine within the said county of Cornwall; and that the head manager of every mine in the said county of Cornwall shall, within ten days after each quarterly account of the mine over which he is head manager shall have been or ought to have been made up, transmit to the Registrar for the time being of the Vice-Warden's court a full, true, and particular account and return of all metals and metallic minerals (except tin and ore) which shall have been brought to sale in or shall have been withdrawn from the mine of which he is such head manager

during the preceding quarter, and shall in such return state the value in money of the respective quantities of the metals and metallic minerals specified therein at the time the same were respectively brought to sale or withdrawn, as the case may be; and that the head manager of every such mine shall, on application from the collector of the Vice-Warden's court, pay or cause to be paid to such collector the sum of one farthing in the pound sterling on the aggregate value of all metals and metallic minerals (except tin and ore) which shall have been brought to sale or withdrawn from such mine during the preceding quarter; and that every such payment by such head manager shall be considered as costs, and shall, on passing his account with respect to the mine of which he is such head manager, be allowed to him accordingly.

XXIX. And be it further enacted, that the Registrar for the time being shall, out of the monies which shall from time to time be in his hands by means of such assessments as aforesaid, and by means of the remaining of the court fees as aforesaid, pay to the said Vice-Warden and to himself and the other officers aforesaid of the said court the sums following, being other moiety of the said court, the sums following:—(that is to say) shall pay on the twenty-fifth day of March and on the twenty-ninth day of September in each year, free from all deductions, to the said Vice-Warden the sum of three hundred and seventy-five pounds, to himself the Registrar the sum of one hundred and twenty-five pounds, to the person filling the situation of Secretary to the Vice-Warden the sum of twenty-five pounds, to the Prothonotary the sum of fifty pounds, and to the collector the sum of seven pounds ten shillings.

XXX. And be it further enacted, that the said Registrar for the time being shall, at the end of every half-year, lay before the Vice-Warden for the time being a full, true, and particular account of the balance remaining in his hands at the commencement of such preceding half-year, and of all monies received by him during such last half-year in respect of such assessment as aforesaid, and when and from whom and from what mine received, and also shall in such account give credit for the remaining portion of the said court fees so in his hands after such payment to the Auditor of the Duchy as aforesaid, and shall also in like manner lay before the Vice-Warden a full, true, and particular account of all the salaries and other expenses paid by such Registrar during the same period; and that a balance shall be thereby struck, showing the balance remaining in the hands of such Registrar at the end of the then last half-year; and that thereupon the Vice-Warden for the time being shall and is hereby required to audit the said account, and also the said account for court fees hereinbefore-mentioned, and if the same shall be found correct, to allow the same respectively, by putting his signature thereto; and that such accounts, when so allowed, shall be filed amongst the records of the said court, and be open for the inspection of all persons in the usual way: provided always, that if it shall at any time appear to the Vice-Warden for the time being, on auditing such account of the Registrar, that there remains a general balance in his hands sufficient to meet all payments hereby authorised to be made thereout for the next half-year, and then in such case the Vice-Warden shall have power and is hereby required to give notice thereof by advertisement in the county papers, or in such way as he shall think fit; and that thereupon no assessment shall be made or become payable in respect of the said one farthing in the pound sterling on the value of all metals and metallic minerals as aforesaid during such succeeding half-year: provided, nevertheless, that, although no such assessment shall in such case be made during such period, the said manager of every mine is required to and shall make such return as aforesaid to the said Registrar of all metals and metallic minerals (except tin and ore) brought to sale or withdrawn from the mine over which he is such head manager, precisely as if such assessments were or would be payable in respect of the ore specified in such return.

XXXI. And be it further enacted, that if the head manager of any mine shall omit to make such full, true, and particular return as hereby required of the quantities of metals and metallic minerals (except tin and ore) brought to sale or withdrawn as aforesaid in the mine of which he is such head manager, or of the value thereof, as is hereby required, or shall, on demand made, omit to pay or cause to be paid such assessment as aforesaid, or shall wilfully make any false or incorrect return, then and in every such case such head manager shall be subject for every such offence to a penalty not exceeding fifty pounds.

XXXII. And be it enacted, that the Vice-Warden for the time being may and shall in the present and every succeeding year order the clerk of the peace of the county of Cornwall to make out a duplicate of the jurors' book at the time in use, or about to be brought into use, or of such part of the said book as such Vice-Warden may think fit to specify in such order; and the clerk of the peace, upon the receipt of such order, shall with all convenient speed make out such duplicate, and deliver the same to the Registrar of the court of such Vice-Warden: and that every such duplicate shall be the book of jurors qualified and liable to serve as jurymen in all cases before the Vice-Warden for the time being, and that every such duplicate shall be kept by the Registrar, and shall be by him used as the jurors' book for the time being.

XXXIII. And be it enacted, that the Registrar of the said court shall cause to be summoned, one week before the first day of each sitting of such Vice-Warden, forty-eight persons named in the jurors' book by him kept as aforesaid to attend at the time and place appointed for holding such sitting; and every such summons shall be according to the form given in the schedule hereto annexed, and shall be served either personally on each such person, or by leaving it at his dwelling-house; and that in summoning such persons regard shall always be had as far as may be to the convenience of the individuals so summoned; and no person shall be summoned oftener than once in a year.

XXXIV. And be it enacted, that the Registrar of the said court shall make a list of the jurors so summoned, together with the places of abode and additions, and shall cause their names to be written severally on slips of paper, and put into a box, and the names of the jurors for the trial of causes shall be drawn out of the box by the Registrar; and each party may, until no more than twelve remain, object to any person whose name is drawn out, without assigning any cause; and if any objection is made to the twelve so remaining, it must be stated to and decided on by the Vice-Warden for the time being; and if any such objection be allowed, the names of the jurors rejected without cause assigned shall be returned to the box, and drawn again until a sufficient number be found to make a jury of twelve; and such jury of twelve shall be the jury sworn for the trial; provided always, that if there shall not be twelve persons attending, or against whom no objection shall have been allowed, it shall be lawful for the said Vice-Warden to order the requisite number of persons from among the by-standers, to be summoned by the Registrar, and sit on the jury, subject to any objections which may be made for causes assigned, except for want of qualification or want of summons; provided also, that the said Vice-Warden may, if he sees fit, direct the Registrar to divide the list of forty-eight jurors into two lists, and to require the persons in the one list to attend and serve for so many days at the beginning of the sittings as the said Vice-Warden shall order, and those in the other list to attend and serve for the residue of the sittings, according as the said Vice-Warden shall think fit for the convenience of the said persons; and then and in that case the Registrar shall divide the said list of forty-eight jurors into two lists, and cause the persons named in each of such lists to be summoned to attend on different days accordingly.

XXXV. And be it enacted, that if any person having been duly summoned to attend as a juror in the court of the Vice-Warden shall not attend in pursuance of such summons, or being thrice called in court shall not answer to his name, or if any such person being present in court, or any such by-stander in court, after having been called shall not duly appear, or after his appearance shall wilfully withdraw himself from the presence of the said court, it shall be lawful for the said Vice-Warden to impose such fine upon every such person or by-stander so making default (unless some reasonable excuse shall be given to the satisfaction of the said Vice-Warden) as to the said Vice-Warden shall seem meet; and if such fine shall not be paid at the time ordered by the said Vice-Warden, the same shall and may be levied by writ of *fiat facias* to be issued out of the common law side of the said court of the Vice-Warden.

XXXVI. And be it further enacted, that the Vice-Warden for the time being shall and may appoint a fit and proper person to be acrier and usher of his said court, who shall hold his office during the pleasure of the Vice-Warden for the time being, and may be removed in a summary manner, and may and shall receive such fees for acting as acrier and usher of the said court as the said Vice-Warden shall from time to time by the virtue of the provisions herein contained authorise.

XXXVII. And be it further enacted, that the Vice-Warden for the time being shall not, during his continuance in such office, practise as a barrister, and that the Registrar for the time being of the said court shall not, during his continuance in such office, practise as a barrister or solicitor or attorney in such court, or in any other court of law or equity in the United Kingdom of England and Ireland.

XXXVIII. And be it further enacted, that the Vice-Warden for the time being shall not demand or take, upon any pretence, any fee, gratuity, or reward whatever; and that such Registrar and other aforesaid officers of the said court appointed under this Act shall not demand or take, upon any

pretence whatever, any fee, gratuity, or reward other than and except such as hereby authorised, or as shall be from time to time settled and allowed by the Vice-Warden for the time being by virtue hereof or of the provisions herein contained; and that if any such person shall offend in that behalf, he shall be removed from the office he shall then hold, and be disabled from again holding the same or any other office under this Act.

XXXIX. And be it further enacted, that a table of all fees for the time being authorised by the Vice-Warden to be taken by any solicitor or attorney practising in his said court, or by any officer of his said court, for business done therein, shall be hung up in some conspicuous place in such court.

XL. And whereas the gaol belonging to the courts heretofore the courts of the Vice-Warden and of the Stannaries is situated at Lostwithiel in the said county of Cornwall; and whereas it would tend more to the public convenience that the court of the Vice-Warden should use as its gaol or prison for all purposes the prison belonging to the county of Cornwall, and situate at Bodmin, in lieu or place of the said gaol at Lostwithiel; be it therefore enacted, that every person hereafter arrested or taken prisoner or detained by virtue of any writ, process, order, decree, or proceeding, issuing out of or from or by either side of the said court of the Vice-Warden or of the Stannaries, or committed for contempt of the said court, shall be taken to the county prison at Bodmin in the said county of Cornwall, or to other the prison for the time being of the said county, in the same manner and subject to the same provisions and regulations in every respect as if such person were arrested and conveyed to the prison by virtue of any writ, process, order, decree, or proceeding issuing out of any of the superior courts of law or equity at Westminster, or committed for contempt by any of the said last-mentioned courts; and the gaoler or keeper for the time being of such county prison as aforesaid is hereby authorised and required to receive into such county prison every person so arrested and conveyed to prison by virtue of any writ, process, order, decree, or proceeding issuing out of or from or by either side of the said court of the Vice-Warden, or so committed for contempt of the said court as aforesaid, and to maintain, support, and provide for every such person in the same manner, as if he had been arrested and brought to the said county prison by virtue of any writ, process, order, decree, or proceeding issued out of any of the superior courts of law or equity at Westminster, or were committed for contempt of any of the said last-mentioned courts; and that all and singular the charges and expenses of maintaining, supporting, and providing for every person so arrested or committed to the said county prison as aforesaid shall be paid and defrayed out of such portion of county rate of the said county of Cornwall as for the time being shall be applicable to the support of the debtors confined in the said county prison.

XLI. And be it enacted, that all jurisdictions, powers, and authorities heretofore lawfully exercised by the Vice-Warden or Steward or any Judge of any of the Stannaries shall be hereafter exercised by the Vice-Warden for the time being; and that all penalties heretofore authorised to be recovered, and all oaths heretofore required or authorised to be taken, and all acts, matters, and things heretofore required or authorised to be had or done in any of the courts of the Stannaries, or before the Vice-Warden or the Steward of any of the Stannaries, shall be and are hereby required and authorised to be recovered, taken, had, and done before the Vice-Warden or in the court of the Vice-Warden, as the case may be; and that all proclamations, returns, certificates, exhibits, matters, and things heretofore required to be made, transmitted, or given to or deposited with any of the courts of the Stannaries, or the Vice-Warden or Steward of any of the Stannaries, shall be and are hereby required to be made, transmitted, and given to and deposited with the court of the Vice-Warden; and all bonds and recognisances heretofore required to be entered into before the Steward or any of the courts of the Stannaries shall be entered into before the Registrar of the said court.

XLII. And be it further enacted, that it shall be lawful for the court of King's Bench at Westminster, on the application of any party to any action or suit on the common law side of the said court of the Vice-Warden, on special and sufficient cause shown by affidavit to the satisfaction of such Court of King's Bench, that an impartial or sufficient trial cannot be had in such court of the Vice-Warden, to remove, by writ of certiorari, all proceedings which may have been had in such action or suit, and to deal therewith, and to make such orders respecting the same and the future trial of and proceedings in such action or suit as to the said Court of King's Bench shall seem meet.

XLIII. And be it further enacted, that all acts, statutes, laws, liberties, privileges, customs, rights, usages, and freedoms at the time of passing this Act in force in any of the Stannaries of the said county of Cornwall shall, notwithstanding any thing herein contained, continue and be and have the same force and effect as if this Act had not passed, save and except so far as the same or any of them are contrary or repugnant to the laws of this realm, or inconsistent with the provisions herein contained, or are annulled, repealed, or altered hereby or by means of any of the powers and authorities hereby given.

XLIV. And be it further enacted, that wherever this Act, in describing or referring to any person or matter or thing, uses the words importing the singular number or the masculine gender only, the same shall be understood to include, and shall be applied to, several persons as well as one person, and to females as well as males, and bodies corporate as well as individuals, and several matters or things respectively as well as one matter or thing respectively, unless there be something in the subject or context repugnant to such construction; and that wherever the word "plaintiff" or "defendant" is used, it shall mean the person instituting the proceedings, or the person against whom proceedings are instituted respectively, in whatever way such proceedings are commenced; and wherever the word "mine" is used, it shall mean any mine, work, or adventure, wherein or connected with which any metals or metallic minerals are worked; and that wherever the words "head manager of any mine" is used, it shall mean the captain, purser, or other person who for the time being shall have the principal superintendence over such mine; and that the powers hereby given to the Lord Chancellor of England shall and may be used by the Lords Commissioners for the custody of or the Lord Keeper of the Great Seal for the time being: provided always that nothing herein contained shall apply to, or affect, or extend, or be considered as extending, to the county of Devon, or the Stannaries within the said county, except as to the service in the said county of Devon of any writ of subpoena issuing out of such Vice-Warden's court as hereinbefore provided.

XLV. And be it further enacted, that this Act shall commence and take effect on the twenty-ninth day of September, one thousand eight hundred and thirty-six.

XLVI. And be it further enacted, that this Act may be amended, altered, or repealed during the present session of Parliament.

#### FORM OF SUMMONS TO JURORS.

You are hereby required to attend and serve as a Juror at the sitting to be held before the Vice-Warden of the Stannaries, at his court, on the day of next, Registrar of day of 183

To A. B.

#### ON THE COMPOSITION OF PLAGIONITE.

BY RUDERNATON.

This mineral has been analysed by Professor H. Rose, who found it to consist of

Lead.....	40.52
Antimony.....	37.94
Sulphur.....	21.53

and has given the formula of  $4 Pb S + 3 Sb S^2$ .

As this combination of sulphur in sulphuret of antimony is in a very uncommon proportion to the sulphuret of lead, namely as 9 to 4, and as Berzelius, in his *Jahresbericht*, has thrown some doubt on the existence of such a compound, which he considers likely to be a mixture of the two, Mr. Rudernatton was induced to repeat the examination of some very distinct and well-defined crystals: he followed the same mode of analysis as Professor Rose, which gave the following results:—

Lead.....	40.52
Antimony.....	37.93
Sulphur.....	21.49—100.

In a second analysis, which was only to determine the quantity of lead, he found 40.81 per cent.

It therefore appears, by these analyses, that plagionite is a peculiar chemical combination.—*Poggendorff's Annals*, 1836, No. 4.

LEIBNITZ AND DESCARTES.—They amused their imagination by conceiving the world to be an extinguished sun or a vitrified globe, upon which the vapours, condensing in proportion as it cooled, formed seas, and afterwards deposited calcareous strata.



## PROCEEDINGS OF SCIENTIFIC MEETINGS.

## BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from page 3.)

But I must hasten on to those few other reports which the present volume contains, but on which I shall have the less to say, as they relate to subjects connected with anatomy and physiology, of less general interest to a mixed audience.

Dr. Jacob has replied to a query proposed by the Zoological committee, at a former meeting, with respect to the uses of the infra-orbital cavities in deer and antelopes, and has pronounced them to be designed as the receptacles of a peculiar odoriferous secretion.

Dr. Hodgkin and Dr. Ruppel have detailed a series of experiments and observations relative to the specific mode of action of acrid poisons, which, whether at once introduced into the stomach, or the circulation, by injection into the veins, seem to operate primarily in the same manner as irritants to the mucous membrane. The Dublin sub-committee, appointed for the purpose, have given in a report connected with a subject of great pathological interest, respecting which none but the experienced medical practitioner ought to pretend to pass a decided judgment; nevertheless, when I look back to the early period of my own professional studies, and recollect the obscurity in which diseases of the heart appeared then to be involved, when their remedy seemed so desperate, as to suggest to one of the most distinguished writers on the subject the motto, "Hæret lateri lethalis arundo," as appropriate to his work, and as significant of the probabilities of cure, and when their very nature was known but partially, and could only be guessed at by methods purely empirical,—when I recollect all this, I cannot refrain from congratulating those of my brethren who are engaged in the duties of the profession from which I am myself a deserter, on the discovery of a new instrument of investigation in diseases of this nature, the use of which being founded on physiological principles, seems susceptible of greater improvement and more extended application in proportion as our knowledge of the animal economy advances.

But in order properly to avail ourselves of the indications of disease afforded by the differences of sound transmitted through the integuments by the heart, it is necessary that we should be acquainted with the nature of its pulsations, and of the sounds occasioned by them in a healthy state; and this information it has been the object of the Dublin sub-committee to embody in the report which was communicated by them last year to the Medical Section.

Such are the principal contents of the volume which records the scientific labours instituted at the express suggestion of the general body, and prepared for its last meeting; but, exclusively of these, many very valuable and elaborate investigations were submitted to the several Sections without any such solicitation.

I may instance, in particular, the views with respect to the classification and the geological distribution of fishes, expounded to us with so much ability by Monsieur Agassiz, whose important labours might perhaps have been suspended, but for the timely assistance dealt out to him by this body, and the opportunities which its meetings afforded, for giving them that publicity which they deserved.

I may point out, likewise, the important results submitted to the Geological Section by Mr. Murchison and Professor Sedgwick, with reference to the Silurian formations of Wales and Shropshire, and the multitude of facts illustrative of the physical structure of Ireland, which were elicited by the exhibition of Mr. Griffith's geological map; an undertaking which, coupled with the researches of Mr. Mackay on the plants indigenous to that country, promises to render us as well acquainted with the natural history of this portion of the empire as we already are with respect to Great Britain itself.

Nor must I forget the researches on comparative anatomy laid before the Medical Section by Dr. Huxley, who pointed out the existence of reservoirs connected with the veins leading to the lungs in the cetacean, an admirable contrivance, by which Nature has provided for the unobstructed circulation of their blood, in spite of the enormous pressure which they have to sustain at the great depths to which they are wont to dive.

The members of the Association had also the satisfaction of witnessing the ingenious manner in which Mr. Snow Harris contrives to render quantities of electricity appreciable by the balance, like those of any gross material substance; whilst such as could enter upon the more refined branches of mathematical analysis must have listened with profound interest to the exposition given by Professor Hamilton, of the ingenious labours of Mr. Jerrard, of this city, in solving equations of the higher orders.

What proportion of such inquiries may be attributable to the influence of this Association, and how much might have been merely the result of that increased taste for physical research to which the Association itself owes its existence, I do not pretend to determine; this, however, at least, must be allowed, that many of the most important truths communicated might have been long in winning their way to general recognition, and in ridding themselves of those exaggerated and mistaken views which are the common accompaniments of every infant discovery, had it not been for the opportunities which these meetings afford, of examining the very authors of them, with respect to their own inquiries; of confronting them with others who have prosecuted similar trains of research; of questioning them with respect to the more doubtful and difficult points involved; and of obtaining from them, in many instances, an exhibition of the very experiments by which they had been led to their conclusions. And it is this personal intercourse with the authors of these great revolutions in Science, which in itself constitutes one of the principal charms of these meetings. Who would not have listened with delight to a Newton, had he condescended to converse on the great truths of astronomy; to a Jussieu, imparting to a circle of his intimates in his own garden at Trianon, those glimpses with respect to the natural relations of plants, which he found it so difficult to reduce to writing; or to a Linnaeus, discussing at Oxford his then novel views with respect to the vegetable kingdom, and winning from the reluctant Dillenius a tardy acknowledgment of their merits? And in like manner, who does not value the privilege of hearing a Dalton discourse on these occasions on his own atomic theory, or a Faraday, (who, however, I regret to say, is on this occasion prevented by illness from attending), explain orally the steps by which he has traced the relations between electricity and magnetism, although every one is aware that the principal facts, both with respect to the one and the other, have long since been made public by their respective authors, and have been abundantly commented upon by others. And no where, perhaps, is it more desirable to instil those sentiments to which I have alluded, than within the precincts of those provincial cities which the Association now proposes to visit. The inhabitants of those great emporiums of commerce and manufactures are indeed often reminded that processes directed by the guidance of chemistry and mechanics constitute the very basis of their prosperity, but they are too apt to regard these and other kindred sciences as the instruments merely of material wealth, and to deem it superfluous to prosecute them further than they are seen to conduce to that one end. That such notions are short-sighted, even with reference to the practical applications of the arts, it would not be difficult to show; but I am ambitious to place the question on a higher ground, and the presence amongst us of such individuals as I have mentioned, will do more towards that object than volumes of argument would effect. It will convince us, at least, that other roads to distinction, besides that of mere wealth, are opened to us through the instrumentality of the sciences; for although, thanks to the spirit of the age, which in this respect, at least, stands advantageously distinguished from those preceding it, the discoverers of important truths are not, as heretofore, allowed to languish in absolute poverty, yet the debt which society owes to them would be but inadequately paid, were it not for the tribute of respect and admiration which is felt to be their due.

It has indeed been sometimes objected, that too large a share of public attention is in this age directed to the physical sciences; and that the study of the human mind, the cultivation of literature, and the progress of the fine arts, have been arrested in consequence. In what degree the accusation is well founded, this is not the place to inquire; although, when we look round upon the many literary characters that adorn this age, we should rather suppose the remark to have arisen from the increasing interest in science than from any diminished taste for other studies. If this complaint, however, had any foundation in truth, it would only supply a stronger argument in favour of an association like the present, the express object of which is to correct that narrowness of mind which is the consequence of limiting ourselves to the details of a single science, or, it may be, to a single nook and corner of one, and therefore to render the prevailing taste of the times more subservient to mental culture, and therefore a better substitute for the studies it is alleged to have superseded. An association, too, which, with no narrow and exclusive feeling towards those pursuits which it is designed to foster, extends the right hand of fellowship to men of eminence in every department upon which the human mind can be exercised, and which would have felt that no higher honour could have been bestowed upon its present meeting than by the attendance of the great poet, and the great sculptor, who own Bristol as their native city.

To alter indeed the character of the period in which we live, is as much beyond the efforts of individuals, as to fix the time of their birth, or the country and station in which their lot is cast; and it is perhaps inevitable, that an age and country so distinguished above all others for the advancement of arts and manufactures, should attach an increased importance to those sciences on which both the latter are dependent. But it is at least consoling to reflect, that Providence has attached to every one of those conditions of society through which nations are destined to pass, capabilities of moral and intellectual improvement, and that the very sciences which so amply minister to our physical enjoyments, also afford the means of those higher gratifications which spring from the exercise of the taste and imagination. Thus, although it may not be easy for the citizen to indulge to any extent in studies alien from the pursuits which engross his hours of business, yet it cannot be deemed incompatible with the latter, to mount up to

the principles of those sciences which are connected with the arts he practices; to study their relation one to the other; and to acquaint himself with the steps by which they have reached their present eminence. It cannot but be useful to the chemical manufacturer to study the laws of that molecular attraction which binds together the elements of the substances which he prepares; to the mechanic to examine the process of the arts in connexion with the general laws of matter; to the miner or land-surveyor, to inform himself with respect to the physical structure of the globe; to the agriculturist, to become acquainted with the principles of vegetable physiology, and the natural relations of plants.

For my own part, intimately connected as I am, both with the first of the commercial cities, and also with the first of the universities, that welcomed the British Association within its precincts, warmly interested in the prosperity of both, and officiating as Local Secretary on either occasion, I have felt personally gratified at seeing the selection of these places justified by the cordiality of our reception in both, and at witnessing the new vigour which has been infused into the Association, in consequence of the support it has therein received. But how much will that gratification be augmented, if it should be found hereafter, that the benefit in either case has been mutual; that these Meetings have cemented those bonds of union between the academic and the commercial portion of the British community, which it is so desirable to maintain; and that, whilst the University to which I belong has reaped advantage, by having its attention called to the interest felt in physical sciences generally throughout the kingdom, my fellow-citizens here will in like manner catch the spirit which pervades our body, and will engage in the pursuit of science, with a juster conception of its high objects, and with a zeal and devotion to its cause, which will not be less practically useful, because it is stimulated by a more disinterested love of truth; less capable of ministering to the operation of the arts, because it is also rendered subservient to mental discipline and improvement.

John Taylor, Esq., Treasurer of the Association, then read the account of the receipts and expenditure, made up to the middle of July this year; from which it appeared that the

Balance in hand at the last Meeting was....	£ 509 16 3
Received from Members at Dublin, and since	2173 0 0
Amount of Interest, Dividends, &c.....	127 10 0
Sale of Volumes of their Transactions .....	375 8 9
	£3185 15 0

## The expenditure was as follows—

Expenses of Meeting at Dublin .....	£235 18 0
Various local expenses .....	121 19 0
Purchase of £1000 Three per Cent. Consols ..	916 5 0
Salaries .....	230 0 0
Grants for various Scientific purposes.....	457 0 0
Printing Third Volume of Transactions.....	517 16 0
Other Printing.....	54 18 0
Sundries .....	43 8 7
	£2377 4 7

Leaving a balance in hand at present of about £608.

The total amount of property belonging to the Association at present, including the value of a number of copies of their Transactions, is about £4564.

Mr. Taylor further stated that the number of tickets issued up to that time was at least 1000, the largest number that had ever been issued at that stage of their proceedings; the probability, therefore, seemed to be, that the number of members attending the Association would be larger than ever they were before, and the pecuniary benefit proportionably greater.

## SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

The business of this section was commenced by Sir David Brewster, who stated to the Association the steps which had been taken towards constructing a lens of rock salt, for which object the sum of 80*l*. had been placed at his disposal at the previous meeting.

It appeared that very fine transparent and homogenous crystals, of rock salt, had been obtained from Cheshire for this purpose, which were considered fully adequate for the experiment, but no further progress had yet been made, owing to the difficulty of finding a person fully competent for the mechanical performance of the task, which involves many niceties and peculiarities not usually met with.

An account was given by Mr. Whewell of the steps proposed to be taken by the committee appointed by the Association, to determine the relative level of the land and sea, a research in which, beyond preliminary arrangements, it appeared that no progress had been made during the year. Some remarkable facts relative to the inequalities of the tide were stated. It appeared that at Bristol the tide rises to the height of about fifty feet, while in the lower parts of the channel it rises but twenty feet, and in most other parts of the coast to a still less height.

The plan proposed to be adopted by the committee was accurately to level, in the same manner as for a canal or railway, both inland and along certain portions of the coast, and to fix permanent marks in various situations, showing the exact results of such levelling. By reference to these marks at future periods, it will of course be definitely ascertained whether the land always preserves the same relative position, and also what is the mean and absolute level of the sea at those places where the experiment was tried.

Professor Phillips then read his Report of the Experiments instituted with a view to determine the Interior Temperature of the Earth.

Mr. Phillips stated that this subject had for a long period engaged the anxious attention of scientific men, both at home and upon the continent; that the most accurate, as well as numerous, experiments indicated a decided elevation of temperature as a more depressed station below the earth's surface was attained; even when the depths descended to were small, this elevation of temperature became large enough to arrest attention: in fact, the temperature of the air, of the water, of the rocks, and of the soil, was found to augment as we descend. But, in order to ascertain, if possible, what portion of this heat arose from, or was connected with, an elevated temperature of the internal parts of the globe, as well as to ascertain whether the causes of these were local or universal, and, if possible, to arrive at the law of its distribution, it was deemed a matter of much importance to get rid altogether of the effect of the air's temperature upon the thermometer, as also the action of water, because the sources of the water in mines, &c. must be in most cases entirely beyond the reach of observation. All these circumstances induced the committee appointed by the Association to conduct experiments upon this subject, to take the temperatures of the rocks themselves alone, as the fundamental experiments. With this view, they had no less than thirty-six thermometers made and carefully compared; and, although they well knew that these thermometers, after all the care which had been bestowed upon their construction, were by no means perfect or exact, yet, as their errors had been carefully noted, by a comparison with the standard thermometers of the Royal Societies of London and Edinburgh, and each thermometer numbered, the errors admit of an easy correction. Many of these thermometers had been already placed under the care of persons adequately instructed to conduct the requisite experiments, and some of them were still in the possession of the committee, who would gladly place them in the charge of any person giving adequate security that they should be applied to the purpose for which they had been procured. The method of using them was this: a hole large enough to receive one of the thermometers is first drilled into the solid rock, at the bottom of the mine, pit, or other proper place of observation, to the depth of two or three feet at least; into this the thermometer is then introduced, and suffered there to remain for a number of days sufficient to ensure the attainment of the temperature of the rock itself. The temperature of the air at the mouth of the pit, and, if possible, the mean temperature of the place, must be observed or obtained. Professor Phillips then stated that observations had been made in this manner, and with some of these instruments, under the directions of Professor Forbes, at mines in the Lead Hills, in Scotland, and that Professor Forbes would take some early opportunity of bringing these observations more immediately under the notice of the Section; at Newcastle, under the direction of Mr. Huddle; at Wearmouth, under the care of Mr. Anderson; near Manchester, and at Northampton, under the direction of Mr. Hodgkinson; and within a few days, Professor Phillips had been enabled, through the kindness of a friend, to place a thermometer in a deep coal mine at Bedminster, in this immediate vicinity (Bristol). The results of these observations, as far as they had as yet proceeded, amply confirmed the fact of the increase of temperature in the parts under the earth's surface. As one example, the Professor stated, that in a mine, the perpendicular depth of which, below the surface, was 525 yards, the thermometer in the rock stood at seventy-eight degrees, while the temperature in the open air at the mouth of the mine varied from thirty to eighty degrees, the mean temperature of the place being forty-seven degrees and a half.

Professor Forbes then gave, from memory, an account of the experiments which he had been the means of instituting in the Lead Hills. Before he did so, however, he wished to state that he had been informed that an artesian well had lately been met with in granite; and he then gave a general description of artesian wells. It was to this effect: that heretofore, in making borings in certain districts through certain alternations of clays, and at length through certain rocks, a supply of water was reached, which rapidly

rose through the boring to the surface, and continued to overflow at the top, sometimes, as the term *fontaine* indicates, in considerable quantity, and with considerable force. He instance the artesian wells or fountains of the London clay districts; and added, that the temperature of these waters was found universally to increase with the depth of their source beneath the surface of the earth. Heretofore, no such well had been obtained by boring through the granite; and if the account, which he had received, were correct, and of its correctness he entertained little doubt, this would be a matter of considerable interest, as well to the geologist as to those who were engaged in scientific pursuits similar to those now under consideration. The observations made under his directions in the Lead Hills, alluded to by Professor Phillips, were almost entirely conducted by Mr. Irvine. These observations were particularly interesting, from the fact that the mines, in consequence of a strike among the workmen, had not been worked for many months, and at the same time it most fortunately happened that they were self-drained, that is, by machinery worked by external power, without the aid of either animals or steam. This most fortunate concurrence of favourable circumstances, which could be expected to be met with in so very few instances, at once disembarrassed the observations from many sources of error, which, but for this, would have still left considerable doubts of the results being, partially, at least, affected by the heat generated by animals residing and working in the mines, as well as of artificial fires kept up for the purposes of ventilation or of originating power. It was upon these grounds that he perceived the importance of them, but had it not been for the valuable assistance afforded him by Mr. Irvine, who descended into the mine, and placed the thermometer and made the observations, he could scarcely have been as successful as the results already obtained warranted him in hoping he should be. These results, which, of course, had not as yet reached the degree of accuracy which he still looked for, led to the conclusion that the temperature in that mine increased about fifty degrees of Fahrenheit for a descent of ninety-five fathoms.

Professor Stevelly stated, that as practical utility was one of the principal objects of the British Association, he might be permitted to add, that the waters of these wells, in consequence of their temperature being in general elevated above the mean temperature of the place at which they delivered their waters, had been applied to the very important practical purpose of freeing machinery of ice in winter, inasmuch, that by their instrumentality, machinery, such as water-wheels, &c., which had always previously been clogged by ice for a considerable part of the winter, to the great loss of the owner's manufactory, were, by the aid of the waters of these fountains, kept constantly free, while the same water had even been previously, in some instances, conducted through the factory itself, with a view to keep up a uniform and elevated temperature within its walls, thus affording a second and a very valuable practical application.

A communication of great interest and importance was made by Mr. Russell, of Edinburgh, respecting the laws which regulate the propagation of waves in water. This gentleman has devoted much time during the last three years to the investigation of this curious and hitherto greatly misunderstood branch of hydrodynamics. He has succeeded in reducing waves to several classes, and also in determining the laws which regulate the motions of some of them. The practical consequences resulting from these researches, as regards the motion and resistance of bodies floating on water, are of great interest, and were detailed before the Mechanical Section. We shall therefore notice the subject more fully in our report of the proceedings of this branch of the Association.

A communication was made by Professor Forbes, detailing the results of a number of experiments made, chiefly among the Pyrenees, "on Terrestrial Magnetic Intensity at great Elevations from the Earth." Saussure had previously inferred, from a series of similar experiments made near the summit of Mont Blanc, that there was no alteration in the magnetic intensity at this elevation. Subsequent observation had thrown some doubt on this conclusion, but Professor Forbes has again arrived at the same result, from all his experiments, with the exception of one case, where the vicinity of iron mines formed an obvious source of error; he, therefore, infers from his observations, that the magnetic intensity remains the same at great elevations, as at the ordinary level of the earth's surface.

A communication made by Mr. G. W. Hall, on "the Connexion observed at Bristol between the Weather and the Tide," detailed some curious facts connected with meteorology. The following rules are deduced by this gentleman from his observations:—

1. The barometer generally undulates at the change of the moon, more often falling than rising.
2. That at these times the weather is generally unsettled for two or three days, and high wind often prevails.
3. That the weather, if it afterwards becomes settled, will remain so till the next change of the moon.
4. That these variations are as perceptible at the quarters as at the new or full moon.
5. That the period which determines the state of the weather is derived from the spring and neap tides, or the full and combined influence of the sun and moon.

Professor Phillips detailed the result of some experiments "on the Direction of the Isoclinical Magnetic Lines in Yorkshire." It appears from these experiments that the Isoclinical Lines (or those having the same magnetic dip) are subject to flexure and irregularity, apparently connected with the physical and geological features of the ground.

In the discussion which followed, Sir David Brewster alluded to the idea first suggested, we believe, by Dr. Dalton, that the seat of terrestrial magnetism may be situated in the atmosphere, and not, as generally supposed, in the earth itself. He spoke in favourable terms of this theory, which, at the next meeting of the Association, he hoped to be able to substantiate by facts and arguments of considerable weight.

Mr. Hodgkinson, who had previously undertaken, at the request of the Association, a series of experiments on the "Hot and Cold Blast," as used in the manufacture of iron, communicated the result of his observations, from which it appeared, that—

These experiments had been conducted on iron from the Carron, the Baffrey, and the Devon Works. He had tried many experiments, of which he gave many of the details. In all cases the hot-blast iron seems to be somewhat, but not greatly, weaker, also its specific gravity somewhat less, except at the Devon Works; but he remarked that the fracture of the cold-blast iron was very white, while that of the hot-blast was grey. Some very curious facts occurred in the forcibly breaking some of the specimens. For instance, when a rectangular plate, having a rectangular rib down its centre, was broken with the rib turned up, it readily broke; but when the rib was down, it required great force to break it, and this was never accomplished until the rib first threw out a wedge-shaped piece, which, in all the experiments, was of the same, or a similar shape.

Having now selected from the Mathematical and Physical Section, all such matter as may be considered to possess general interest, or to connect itself with the objects of our publication, we shall proceed next week to give reports of the Sections falling more immediately within our province, or those of Chemistry and Mineralogy, Geology and Geography. In these Sections many of the communications will be found of great interest and importance. Mr. Charlesworth's paper, which we shall give at considerable length, is of great interest, as connected with the classification and identification of tertiary deposits. The researches of Professor Sedgwick and Mr. Murchison throw great light on the hitherto obscure mass of slaty rocks, constituting greater part of Devonshire. The experiments of Mr. Fox, of Falmouth, are highly interesting, as illustrating the mode in which Nature may have formed the various ores or metallic compounds existing in mineral veins; while those of Mr. Cross, bearing on the same subject, promise to constitute a new era in this department of science.

## LAMBETH LITERARY AND SCIENTIFIC INSTITUTION.

The season opened on Tuesday evening, September 17th, with a conversation, which took place at the rooms of the institution, the walls of which were hung with pictures by the old masters, and some curious pieces of ancient armour; on the various tables were also displayed a number of articles of *verru*, specimens of mineralogy, rare plants, and curious elms. The rooms were opened at nine o'clock, and were shortly afterwards completely filled with company, the great majority being ladies. Some very interesting papers were read, amongst them one upon poetry, which exhibited considerable talent in the composition.

## MECHANICS' INSTITUTION.

On Tuesday evening, the 17th instant, Mr. Hollis resumed his inquiries into the nature, uses, and transformations of iron—being the seventh of his course on the "Mechanic Arts." Mr. BRIDGWATER in the chair. By the introduction of specimens and experiments, he exhibited to the audience a very useful and interesting display of the properties and qualifications of this metal—proving its amazing tenacity, powers of adhesion, and its affinity for animal carbon. He clearly pointed out the means of superfluently impregnating this metal with a steely surface by the process called case-hardening; deprecated the absurd opinions and impracticable



directions of a celebrated writer on this subject; and observed, that nine times out of ten the experimenter was disappointed in following the modes prescribed by receipts which issue from the book-making market: this proves the necessity for a more intimate acquaintance between the masters of science and the practical mechanics, which would assist both in their investigations of causes and effects, and enable the young inquirer to supply himself with certain facts to produce practical results. The thanks of the meeting were voted to him for his exertions upon the occasion.

## REVIEWS.

*The Steam-Engine.* By the Rev. D. LARDNER, LL. D., F.R.S. Taylor and Walton.

The sixth edition of this very useful and popular work is now before us, and at this late period any remark in its praise from our pen would be but to re-echo the generally expressed opinion of the press; while the circumstance of its having passed through five editions is in itself one of the strongest and most satisfactory evidences of its utility and of the opinion of the public.

The volume now before us has been revised and considerably enlarged since the first appearance of the publication; and the twenty-eight "Plain Rules for Railway Speculators," will, we doubt not, be read with interest at a moment like the present, when railways are so much in favour, and lines are projected from all parts of the kingdom.

On this subject (prefacing the "Plain Rules," which cannot be misunderstood,) we have the following observations on the operations of the day, in which it is hardly necessary for us to say we fully concur:—

The facilities with which these joint stock companies offer for investment of capital, even of the smallest amount, the temptations which the prospect of large profits hold out, and the low interest obtained on national stock of every description, have attracted a vast body of capitalists, who have subscribed to such undertakings with the real intention of investment. But, on the other hand, there is a very extensive body of speculators who engage in them upon a large scale, without the most distant intention, and, indeed, without the ability, of paying up the amount of their shares. The loss which the latter class of persons may sustain would, probably, excite little commiseration, were it not for the consequences which must result to the former, should a revulsion take place, and the market be inundated with the shares of these gambling speculators, who buy only to sell again. Effects would be produced which must be highly detrimental to a large proportion of the *bona fide* subscribers. It may, therefore, be attended with some advantage to persons who really intend to make permanent investments of this nature, to state, in succinct and intelligible terms, the principal circumstances on which the efficiency and economy of railways depend, so as to enable them, in some measure, to form a probable conjecture of the prospective advantages which the various projects hold out.

The following observations on steam navigation, as directed to the project of a line of communication between London and New York, well merits attention; and with which we must on the present occasion concur our notice of the work, recommending it, as we cordially do, to the attention of those few who may not have condescended its pages:—

Among the many projects which have lately been announced for extending the application of steam power to transport, one of the boldest enterprises is that which contemplates the construction of a high steam-road between the metropolis of the old and the metropolis of the new world,—a grand line of intercourse by steam between London and New York. Some projectors, influenced by a more sanguine temperament, and free from those apprehensions which a full perception of the mechanical difficulties which, in the present state of science, they will have to encounter would inspire, have boldly announced the design to attempt an unbroken sea voyage between those important places. A due consideration of the facts and principles which have been explained in the present chapter will, however, it is hoped, awaken them to a better sense of the natural and mechanical obstacles which will stand in their way. It appears from very extended experience and observation, that in the average weather incident to the voyage between Falmouth and Malta, with all the skill and discipline and unbounded application of mechanical aid, which are necessarily brought into play in our government marine, and with vessels unnumbered by commerce, the average speed has not exceeded seven and a quarter miles an hour. The voyage between Britain and the United States is not one to which the principle of average weather can be truly applied. The well-known *trades* which blow from east to west round our equator, cause a derangement in the atmospheric equilibrium, which is redressed by a contrary current in the superior parallels of latitude from west to east. This is a phenomenon which the mariner must encounter who traverses that portion of the Atlantic between the west coast of Ireland and New York.

It is consequently apparent that the average weather, in going to New York, will be more unfavourable than any average deduced from observations made on waters not obnoxious to the same periodical phenomenon; while, on the other hand, the average of the returning voyage will be to a like extent favourable. In testing, however, the practicability of the project here contemplated, it is clear that the *worst* average must be assumed; and that, therefore, we would not be justified in supposing that so great an average speed in the outward voyage could be attained as seven and a quarter miles an hour.

The distance from London to New York, supposing one uninterrupted voyage were possible, would be about 3500 miles. It has been shown that, even in average weather, the consumption of fuel would be at the rate of the twentieth part of a ton per horse-power per hundred miles, which would give one and three-fourths tons per horse-power, for 3500 miles, being more than the total quantity of fuel which the Admiralty steamers are capable of carrying.

If to this it be added, that in the outward voyage the average weather must be more adverse than that average from which the assumed consumption of fuel has been deduced, it will appear how little hopes of success can at present attend this project.

Seeing, then, that the geographical position of the points proposed to be connected, combined with the atmospheric phenomena to be encountered, place such a voyage beyond the present limits of the powers of steam navigation, prudence suggests, at least until those powers acquire some extension, that we should consider whether and by what means the contemplated route may be resolved into voyages of more practicable extent, so as to be still compatible with economy and expedition; and if we find that means are presented which, even with somewhat less economy, are still more expeditious, it may be presumed that the incidental advantage of doing a great local benefit to an important portion of the British dominions, which unhappily heretofore has been too much neglected, will not be wholly disregarded.

An inspection of the map will at once suggest the western coast of Ireland as the most convenient and advantageous point of final departure for the New Continent. That coast is fringed with numerous harbours, spacious, deep, and sheltered: it is connected with the heart of the country which it adorns by some of the finest rivers in Great Britain, terminating in some cases in extensive navigable lakes. The surface of the country, between some of the western harbours and its metropolitan bay, presents features which will in a moment catch the eye of an engineer, and obtrude upon him the means of constructing a line of railroad possessing every mechanical facility for rapid transport. The ports of Dublin and Liverpool have been already brought almost into contact by the wondrous powers of steam; and the distance between London and Liverpool is speedily about to be abridged from thirty hours to six, or most probably even three.

The distance from the western coast of Ireland to the nearer points of the American continent does not exceed 2000 miles; this, it is true, comes fully up to the present limit of practicable steam voyages; but, with so great a prize in view as the solution of this important mechanical problem, can it be doubted that the almost unbounded powers of British genius will not soon stretch the limits that slight degree beyond their present extent which will be sufficient to render the proposed voyage, under all the circumstances of the case, practicable and profitable? Should it happily prove so, we may hope to see the stream of human intercourse, social and commercial, flowing between the European and American continents across our islands; spreading, as it passes, wealth, fertility, knowledge, and civilization. If it be true, that even among the highly improved and civilised people of Britain through which the intercourse must be carried, these advantages be great, what measure shall we put to the blessings which the consummation of such a scheme would shower upon the neglected and hitherto degraded, and the yet ardent and intellectual population of Ireland! It would, perhaps, be difficult for political or statistical ingenuity to devise any scheme which would so certainly and incontestably be followed by the rapid civilization and pacification of that country. The main stream which would thus be carried across it would forthwith throw off innumerable ramifications, extending through all parts of the surrounding districts. The restoration of order, the re-establishment of respect for the law, the increased demand of labour and improved means of subsistence, would be consequences equally natural and necessary. The spirit of insubordination, which has continued to dam out the overflowing capital of this country, would be broken down; and the abundant market of labour which Ireland offers would attract the English capitalist by a law as inevitable as that by which the needle is governed by the magnetic influence.

These considerations must freely be admitted to be indirect, and such as, by the common laws which regulate the actions of the individuals composing society, cannot be expected to operate strongly; but for that very reason they use the precise circumstances which demand the attention of the statesman; and in such a case, forming as it does an exception to the general law

of political economy, that individual interest is the best index to public advantage, the kingdom requires the interposition of the statesman to give such facilities to individual enterprise as the powers with which he is intrusted shall enable him to afford.

*Repository of Patent Inventions, No. 33, for September.* J. S. Hodson.

This periodical pursues its even course, and contains, as usual, "Specifications of Patents," "Law Reports on Patent Cases," with list of "expired and new Patents." The plates which accompany the present number are very neatly executed, but possessing so little original matter as the work does, we cannot but consider the price as excessive, although the plates to which we have referred must, from their minute details, necessarily be expensive. There does not appear to be any extract we can make which is suitable to our columns on the present occasion, if we except the paper of a correspondent, on

**THE NATURE OF VARIOUS SPECIES OF MORTAR.** BY PROFESSOR FUCHS.—Fuchs has studied the nature of various species of mortar, and proved that their induration depends upon the formation of silicates of lime, and sometimes also of alumina silicates. These silicates retain the water, and acquire the hardness of masses of stone, while the hydrate of lime in excess is gradually united with carbonic acid; so that the hardened mortar may be considered as a mixture of carbonate of lime and of zeolite. Opal, pumice-stone, obsidian, and pitch-stone simply pulverised, form a good cement with hydrate of lime, but quartz and sand only produce a hydrated silicate upon the surface of each grain, which connects the mass, it is true, but which does not as speedily become solid. The finer the powder to which the quartz has been reduced, the more solid the mass becomes. If one-fourth of lime be mixed with the quartz, and the whole be well calcined, so that the mass becomes a frith, if it be afterwards pulverised and mixed with one-fifth of lime, an hydraulic mortar is obtained, which attains sufficient hardness to admit of being polished. Felspar with lime hardens slowly, and only at the end of five months, but calcined with only a small quantity of lime it becomes much better. Water abstracts from this mortar six per cent. of potash. Common potter's clay, which is worth absolutely nothing when not calcined, produces, when calcined with lime, a cement which hardens perfectly well, provided it do not contain much iron. Fuchs having found that *steatite*, which had been heated to a bright red heat, would combine with lime, and thence concluding that magnesia has a very strong affinity for silicic acid, tried the employment of calcined *dolomite* for the cement, instead of common lime, and found that it greatly surpassed the latter, both for the preparation of common mortar, and for that of hydraulic mortar: he even obtained good mortar of the latter kind, with calcined *marl*.

*The Railway Magazine and Annals of Science.* Smith and Elder.

The number for the present month is embellished with a neatly-executed map of the City and Richmond Railway, which is very pretty on paper, but which we apprehend, even in despite of the axiom prefixed to the paper itself, has some slight difficulty to contend with ere it "be crowned with complete success;" but this is not our matter. The number before us bears evidence of improvement, and that very considerable, having several original papers by the editor, who appears to be pursuing that course which must, in the end, be successful; although, like ourselves, with reference even to railway companies, he finds "there are some who are so particularly attached to privacy, that to make any inquiries of the state of their returns to lay before the public is a heinous offence. It seems as if they had a great aversion to any publicity except calling for deposits and instalments." This is what he must expect; while the freedom with which accounts are furnished of some companies are, we feel assured, to be looked upon with equal suspicion.

It does appear to us extraordinary, that companies professingly public, whose shares are disseminated through the London, Manchester, and Liverpool markets, should be desirous of avoiding publicity, and thus engendering suspicion as to the course they are pursuing, while an injury is done to the shareholders generally by the public being kept in ignorance of the value of a commodity which they are at the same time invited to purchase.

The following extract, suited to the times, will best enable our readers to form an opinion of the work itself, as being from the pen of the editor:—

Every man who has the interest of his country at heart sees the necessity of aiding, to the utmost of his power, the formation of railroads, when bottomed on public utility, and conducted by men of honour, intelligence, and honesty. Every man capable in the slightest degree of ratiocination, and of looking ever so little beyond the present, must also see the immense influence these projects will have on the future welfare and prosperity of the empire; not only is their ostensible object—the reduction of the time and expense of internal communication—but in the labour they will create, the circulation of capital they will cause, and the immense impetus they will give to every species of trade, how little soever it may appear to be connected with them. The only apprehensions in honourable minds are, that we are progressing too fast for our means; that we are grasping to accomplish in one or two years what ought in common reason to be the work of some sixteen or twenty; and that the popular prejudice in favour of railroads will furnish food for villany to feed on, to the injury and ruin, perhaps, of thousands of innocent persons. Hence the strong denunciations every now and then made in Parliament and by the press to the wild manner in which railroad schemes are indiscriminately supported by the public. Friends as we are to railroads, and most happy as we should be to see them, whenever they can be constructed with advantage to their shareholders and the community, we are bound to acknowledge our conviction that several now before the public, and not a few of them which have even received the sanction of the Legislature, will end in disappointment and loss.

*Mechanics' Magazine, Part 163, Vol. 25.* J. Cunningham.

The part for the last month contains several interesting articles, to which we shall have occasion to refer, as also to other portions of this useful miscellany, treating not only on machinery, but on several subjects appertaining to railways, which, although in some degree neglected by us of late from want of space, is one well deserving not only our attention but that of the public, who are involved to so great an extent in railway undertakings, and to whom, therefore, all information and inquiries are of moment.

Mr. Dickson's reply to the Cornish engineers, or rather to a clever letter inserted in a former part, from Mr. John S. Enys (whose paper, published in the Transactions of the Polytechnic Society of Cornwall, does him much credit), is among the several subjects to which our attention would be on the present occasion directed but for want of space. We shall, however, in an early number endeavour to give an abstract of the correspondence, which will doubtless attract the attention of Cornish engineers. We are at all times glad to see subjects of this nature mooted, as it is ever beneficial in eliciting truth, tearing off the garb of science, where such is assumed; and, on the other hand, confirming by evidence the truths where they bear the test of inquiry.

*The Engineer's and Mechanic's Encyclopedia.* By LUKE HEBERT. Thomas Kelly.

It was our intention to have noticed this publication last week, having, on that occasion, extracted an article on "Mine and Mining," which appeared in Part II., lately published. Referring, as we do, to that as evidence of the labour and talents devoted to the getting up of the work, we feel that any remark on our part in praise of the articles themselves to be unnecessary, while we may, however, speak of the manner in which the wood-cuts, illustrative of the several subjects treated upon, are executed. Their number, and the ability displayed in their execution, are such as could alone be justified by an extensive sale, which we doubt not the work must long ere this have attained: when, however, it is considered to whom the publication is addressed, being not only useful, but we would almost add, indispensable, as collecting in two volumes (published in sixteen monthly parts) all that is interesting and instructive to the engineer and mechanic, it is hardly to be wondered at that the publishers should have deemed it worthy of the expense incurred in its publication.

In our present number will be found extracts from the work, and to which we shall occasionally refer.

**FINE ARTS.**—The fine collection of paintings, marbles, and bronzes, given by the late Sir James Erskine to the College of Edinburgh, were brought over from Torry House on Friday, and deposited in the College library and great staircase. The collection of paintings, forty-six in number, are all specimens of the most eminent masters of the Dutch, Flemish, and Italian schools. The marbles and bronzes, forty in number, are all very fine of their kind, and many of them rare specimens of Grecian and Roman sculpture. This magnificent gift was intended as the foundation of a gallery, in connexion with the University, for the improvement of the fine arts in Scotland. It is due to the memory of the late Sir John Erskine, that he gave his zealous aid and assistance in recovering some of the pictures that had been sent to London for repairs a little before Sir James's death, and which but for Sir John's exertions might have been lost. Miss Erskine, too, deserves the warmest gratitude of the public, for the care bestowed upon the collection, which has been under her charge since her brother Sir James's death, and which she has given over to the trustees in the handsomest manner.—*Caledonian Mercury.*

## VISIT TO THE QUICKSILVER MINES OF IDRIA.

BY AN OFFICER IN THE AMERICAN NAVY.

You know I travelled through Germany as a pedestrian—a mode of travelling which I would recommend to others through that interesting country. You must imagine me then on the second day of my journey from Trieste to Vienna, in a region thickly settled and well cultivated, and with a mixture of hill and dale sufficient to make it highly picturesque. An old countryman with whom I stopped to converse about noon, informed me that by taking a cross-cut over the country, I should make my road to Idria much shorter than by following the highway; and as I am fond of by-ways, I received his information with pleasure, and soon after struck into a waggon-track, to point out which to me he kindly left his work. The waggon-track, after leading me through some retired villages, dwindled into a foot-path, and even this soon after disappeared, and left me alone among the dills; but a lover of nature is never solitary, and particularly with such varied and beautiful scenery as almost every step opened to view. I am strongly tempted to describe some parts of it, and also the simple and hospitable manners of the people—but this would not be exactly suited to a journal of science. The country towards evening became a constant succession of steep rounded eminences, generally of considerable height, and just before sunset reaching the summit of one of the highest, I had just under my feet the pretty little town of Idria. It is situated at the bottom of a deep valley or green, the houses were white, and as the streets have to follow the windings of the green ravines, it has a simple and very pleasing appearance. Near the centre is a conical hill, with a church on its summit, from which a line of a dozen little chapels, along the side of the eminence, showed the course of the *Via dolorosa*—sometimes an appendage to papal churches. A stream of water about forty yards in width, dashing along the bottom of the valley, and several of the excellent German roads, running zig-zag up the steep ascents, completed the view. At the entrance of the village my passports were examined, and the officer having ascertained that I wished to examine the mines, said he would send a person to accompany me. Accordingly, a sergeant soon after called at the public-house where I lodged, to say that the mining operations were carried on day and night, and that I could enter at any time: I had noticed from the hills a dark crowd of men in front of a large building, and those, he told me, were the evening gang about commencing the descent. I appointed six o'clock in the morning, and on waking found him waiting for me. At the building alluded to, which is on one side of the village, and covers the entrance to the mines, we changed our dresses, and the keeper unlocking an iron gate, we found ourselves in a horizontal gallery three or four hundred yards in length, running directly in at the foot of which the edifice is erected. Here we came to a small chapel with a light burning before the picture of the Virgin, and turning short to the left, commenced the descent. It has nothing difficult, being effected the whole way by means of stairs in pretty good order: indeed, the mines have nothing corresponding to the ideas of terror which we are apt to connect with such places, except the atmosphere, which, throughout the mine, must be strongly impregnated with mercurial vapour, and is constantly producing salivation among the workmen. Having descended by seven hundred and twenty-seven steps, reaching to a depth of one hundred and twenty-five fathoms, we arrived at the region where chiefly the cinnabar is procured. The mining operations are carried on principally in galleries, the friable nature of the ground or rock seldom admitting of larger chambers. The cinnabar is in strata of from two to six inches in thickness, and of a variety of colours, from dark to light red, the quicksilver sometimes being mixed with it, sometimes occurring in the intervening strata of earth or stone. Sometimes the cinnabar is of a brilliant red, and once I found it in small crystals, but such specimens are rare: generally it is of a dull red colour, and the stone is so brittle, that nothing more than a pickaxe is required. The strata affording the quicksilver appeared to have no particular direction, and occupy about one-third or one-half of the entire mass of rock. Proceeding a short distance, however, we came to galleries where the cinnabar is less common, and the quicksilver is the chief object of search. It occurs here sometimes imbedded in a friable rock, sometimes in a kind of earth, in appearance and hardness resembling talcose slate, but principally in the former. Generally it is in particles too minute for the naked eye, but often when the rock is broken, small globules present themselves, varying from a size just large enough to be seen up to that of a common pin's head. These globules are not distributed at random through the mass, but the substance in which they occur forms strata usually about one inch or two in thickness.

Descending still lower, we soon came to the richest part of the mine. Here the *gangue* consists almost entirely of talcose earth mentioned above, and the globules are so large, that when it is broken they fall out and roll to the bottom of the gallery. The labourers here are relieved every four hours, being unable, from the state of the atmosphere, to work longer than this at one time. In the other parts of the mine they work eight hours. There are three hundred and sixty altogether employed in the mines, divided into three companies, and working each eight hours out of the twenty-four: their pay is only from 15 to 17 kreutzers (12 to 13 cents) a day, the usual pay of day labourers throughout Germany. I found several of them suffering from the effects of the mercury.

Having loaded myself and the guide with specimens, I returned by the same way to the upper mine, and proceeded next to examine the washing rooms, which are situated a few hundred yards from the mines. The *gangues* containing the metal is carried to this house, and if it is of the earthy kind, it is broken up, and thrown upon large sieves, by means of which the loose or native quicksilver (called here *yung frau* or virgin quicksilver) is separated from the earth: the latter is then cast into shallow boxes, open at the ends and a little inclined, and a gentle stream of water being made to pass over it, a rake is used, and the earthy matter is carried off. There are seven of these boxes in succession, and by the time the residuum reaches the last of them, it resembles a heavy grey powder, and is sufficiently pure to be carried to the vapour furnace. The stony fragments require only a slight washing to cleanse them from the outward earthy impurities.

The furnace is half a mile lower down the valley, and at the extreme end of the village. It consists of a circular walled building, about forty feet diameter by sixty in height, on each side of which there is a continuous range of chambers ten or twelve feet square, and nearly as many in height; by means of small square openings in the partition walls, the air is allowed to pass from the centre building to the remotest. Each has also a door communicating with the exterior air. These buildings are all of stone, and are plastered within. The *gangue*, after being prepared in the washing-house, as already described, is removed to this edifice, and placed in earthen pans four inches deep and fifteen in diameter, which are piled up so as to fill the centre building. The doors of the chambers are then carefully walled up; and a strong fire having been lighted under the centre building, the quicksilver rises in the form of vapour, and passing into the small chambers, is there condensed by the cold atmosphere around them. Some of the *gangue*, you will observe, is brought here in the form of the native rock. I understood them to say that the expansive power of the vapour, together with the heat of the fire, was sufficient to cause the rock to disintegrate, and thus allow the escape of the quicksilver. When this process is over, the door-ways of the chambers are once more opened, and the quicksilver, which is found chiefly adhering in drops to the sides and ceiling, is scraped off, and running into a hollow in the floor, is taken thence to the cleansing and bottling-rooms. It appears to act on the mortar of the chambers, for I found the latter flaky, and the crevices all filled with small globules.

The cleansing process is very simple, a piece of canvass being merely spread over a funnel, and the quicksilver being made to pass through this, comes out sufficiently pure. That intended for home consumption is then tied up in sheep-skins, while that for exportation is put in iron-bottles, large enough to contain sixty-eight pounds. The furnace is kept in operation only during the winter months, and then the vapour which escapes from it is a serious annoyance to the town; they have a blast three times every fortnight.

The price of quicksilver at the mines is 112 florins for one hundred German pounds, or about 44 cents for an American pound. The quantity annually procured is about one hundred and sixty-four tons; formerly it was greater, and brought a better price; their market, which is chiefly in China, having been injured by competition from the quicksilver mines near Almería, in Spain.—*Silliman's Journal.*

**GREENWICH RAILWAY.**—The Greenwich Railway Company have commenced lighting their line with gas.



## LEAD MINING.—CORNISH MINERS.

From the success which has attended the working of our insular mines, lead is become one of the staple commodities of this island, and from recent discoveries it is highly probable that other fossils, not less valuable, will at no distant period be articles of extensive exportation. As the mineral riches of Mona has never been effectually explored, it is, therefore, impossible to form a conjecture of the extent to which mining operations may yet be carried, by spirited and enterprising individuals or companies. The prosperous working of mines in every country where they exist, is not only highly advantageous to the proprietors or speculators, but affords beneficial employment to a numerous body of workmen, who generally obtain a very comfortable livelihood. Among those so fortunately circumstanced, the miners of Cornwall are particularly deserving of notice, as an example of industry and propriety of conduct well worthy of imitation by their brethren in other mining districts. The following brief abstract, describing the mode of life and condition of a Cornish miner, may not, it is presumed, be unacceptable to such of our readers as feel an interest in the welfare of the industrious community:—

Those parts of the country where the mines are chiefly situate, and worked to the greatest advantage, present a curious aspect to the eye of an inquisitive stranger. The hidden paths of the miners in the bowels of the earth, can be traced above ground by many heaps of "deads" (slaty poisonous rubbish, thrown up to clear the works), which rise up among the green fields and the grazing cattle, like enormous mole-hills. Steam-engines and wharfs (large capstans worked by two or four horses) are scattered about; and in the neighbourhood of the workings are sprinkled, one by one, a number of small white-washed miners' cottages, which, being neither on or near a road, exhibit to the view of the spectator the appearance of having been dropped down for no useful purpose whatever. Such, or nearly similar, is in most cases the superficial prospect of a country, the principal wealth of which is subterranean.

But it is in the morning, when the people repair to their work, that the scene becomes animated and interesting. From the numerous cottages, as far as the eye can reach, men, women, and children of every age begin to creep out; and it is curious to observe them all converging, like bees, towards the small hole at which they are to enter the mine. On their arrival, the women and children, whose duty it is to dress or clean the ore, resort to the rough sheds under which they have to work, while the men, having stripped and put on their underground clothes (which are coarse flannel dresses), one after another descend the several shafts of the mine, by perpendicular ladders, to their respective levels or galleries, one of which is 990 feet below the level of the ocean. As soon as they have all disappeared, a most remarkable stillness prevails, and scarcely a human being is to be seen. The tall chimneys of the steam-engines emit no smoke, and nothing is in motion but the great "bobs" or levers of these gigantic machines, which, slowly rising and falling, exert their vast power to lift either the water or the produce from the mine, or to stamp the ores. In the tranquillity of such a scene, it is curious to call to mind the busy occupations of the hidden thousands who are then at work:—

o contrast the natural verdure of the country with the dead produce of the mines, and to observe a few cattle ruminating on the surface of green sunny fields, while man is buried and toiling beneath them in darkness and seclusion. The return of the miners from their labours is another spectacle which cannot fail to interest the reflecting observer. Those who have paid attention to the wearisome occupation of these industrious people through the day, will scarcely regret to see them rising out of the earth, and issuing in crowds from the different holes or shafts around,—hot, dirty, and jaded, each man with the remainder of his bunch of candles hanging at the bottom of his flannel garb. As soon as the men come to grass (as it is termed), they repair to the engine-house, where they generally leave their underground clothes to dry, wash themselves in the warm water of the engine-pool, and put on their clothes, which are always exceedingly decent. By this time the females and little boys have also washed their faces, and the whole party, which, in what are called the Consolidated Mines, amount to sixteen hundred, migrate across the fields in groups, and in different directions, to their respective homes. Generally speaking, they now look so clean and fresh, and seem so happy, that one would scarcely fancy they had worked all day in darkness and confinement.

The old men, however, tired with their work, and perhaps sick of the vagaries both of the outside and inside of this mining and undermining world, plod their way in sober silence,—thinking probably of their supper. The younger men proceed talking and laughing, and when the ground is good, they sometimes stop and wrestle,—one of their favourite amusements. Grown-up boys for the most part advance by playing at leap-frog, or similar diversions; the little urchins run on before, for the purpose of gaining time to stand upon their heads; while the young lasses, sometimes pleased and sometimes offended at what happens, smile or scream as circumstances may require. As the different members of the group approach their respective cottages, their numbers of course diminish; and the individual who lives farthest from the mines, like the solitary survivor of a large family, performs the last few yards of his journey by himself. On arriving at home, the first employment is to wheel a small cask in a light barrow for water; and as the cottages are built to follow the fortunes and progress of the mine, it often happens that the miner has two or three miles to go ere he can fill his cask. As soon as the young men have supped, they generally dress themselves in their holiday clothes,—a suit better than those in which they work, but not so good as their Sunday clothes. In fact, the holiday clothes are the Sunday clothes of last year; and thus, including his underground flannel dress, almost every Cornish miner possesses four suits of clothes.

The Sabbath-day is kept with great attention by the miners and their families. Nor ought it to be omitted, that the whole mining community, male and female, are remarkably well dressed, and as they come from church, or other place of worship, there is certainly no labouring class in England at all equal to them in appearance; for they are naturally, like the natives of Mona, personable and good-looking. Employed under cover from sun and wind, their complexions are never weather-beaten, but on the contrary often fresh and ruddy. They are without affectation a cheerful people, and, indeed, when one considers how many hours they pass in subterranean darkness, it is not surprising that they should look upon the sunshine of the Sabbath as the signal, not only of rest, but of high and active natural enjoyment.—*Manchester Liberator.*

## EFFECT OF DRAWING, ROLLING, ANNEALING, &amp;c. OF THE METALS.

In a paper on the ductility and malleability of certain metals, and on the variations of density which they undergo by different operations, M. Baudrimont develops the following interesting facts.

At a temperature rather above a cherry red, iron wire remained three months, surrounded by charcoal, without cementation taking place. A white heat, in five minutes, gave the properties of cast-iron to a square bar of malleable iron, of four-tenths of an inch on a side.

Wires of copper, and of alloys of copper and zinc, are increased in diameter, and diminished in density, by annealing. The operation of rolling condenses the metals more than that of wire-drawing. The density of iron and copper is greater, if the metals are heated before being passed through the rollers. The reverse is the case with alloys of copper and zinc. The density of the metals is greatest when drawn into very fine wires.

Wires may be increased in length in two ways, by a diminution in the area of their cross section, or by increasing the distances between their particles. When wires are lengthened in the manner last named, they return to their former length by annealing.

Hydrogen has an action on copper and silver, at high temperatures, which permanently separates their particles. On alloys of copper and zinc, and even of silver and copper, it has no such action.

Wires of different metals, which, after passing through the same hole in the wire-drawing plate, have different diameters, acquire equal diameters by annealing.

The diameter of a wire increases, very slowly, by time, after passing through the wire-drawing plate. Wires which have been bent, and then straightened, re-acquire a curvature.

Wires exposed to a high heat lose a part of their tenacity. They require to be annealed in wire-drawing, not to render them more tenacious, but to allow the particles to resume the positions from which they may again be displaced. The loss of tenacity is common to copper, iron, platinum, and the alloys of copper and zinc.

Brass wire approaches to iron in strength, while copper is inferior to it. Brass may be used instead of iron, where the latter would oxidate too rapidly.

The iron wires are given at strengths from 79,000 lbs. to the square inch to 127,600 lbs. The brass wires from 78 to 87,000 lbs. to the square inch. Copper from 38 to 44,000 lbs. The diameters of the least and greatest wires were, iron, .014 inch, and .205 inch; brass, .070, and .267 inch; copper, .019, and .285 inch.

The finer wires bear greater weights, in proportion to their areas, than the coarser ones, because the particles of the former are compacted through the whole cross section, while those of the latter, for a certain depth only, are thus forced together.—*Ann. de Chim. et de Phys.*

ASSAYING GOLD AND SILVER PLATE, &c.—The Act passed in the last session to assimilate the law of Scotland to that of England, "by fixing the standard qualities of standard gold and silver plate, and to provide for the assaying and working thereof," will come into operation on the first of next month. The marks to be used at the Edinburgh assay-office are the King's head, thistle, a castle, and a letter, to be varied annually, but for the present to be D, in old English.

## CARN BREA.—MINING OPERATIONS.

(Continued from No. 54.)

What progress was made in mining by the Cornish tinnners, as we may now term them, previous to the return of the Phœnicians, is not easily determined. But of two facts they could not now be ignorant, namely, that the tin was derived from their several moors, and that it was rendered malleable by the action of fire; and we may rationally conclude that they were assiduous to devise artificial means to procure a further supply of that article which they had bartered with the Phœnicians on terms so advantageous; and without doubt these circumstances tended to enhance the value of their turf ground in their estimation. Here it may be well to introduce a few observations on the manner in which they secured their several rights, consisting of those parts of the different moors, commons, or wastrel, from which, as individuals, families, or communities, they were wont to derive their supplies of fuel, out of which they had evidently extracted their ornaments, and to which they now intended to apply their individual or united energies for the purpose of obtaining tin. This, as well as all other matters connected with the early part of our mining history, is necessarily involved in some obscurity; but to the impartial and unprejudiced mind no greater difficulty occurs in penetrating the shades with which this question is enveloped, than that of any other of equal standing. It is well known that the Cornish fishermen, not only at the present day, but from time immemorial, marked out their several and respective fishing tracts, by splitting up turves in different places along the cliffs. It is equally well known that the inhabitants of the Cornish villages who were used to cut their turves from the different moors, commons, and wastrel, marked out, from time immemorial, their several and respective portions, at stated periods, by cutting up boundary turves at each of the four corners of that patch of moor, common, or other wastrel, from which they intended subsequently to derive their stock of fuel. So also the Cornish tinnners, from time immemorial, have been wont to mark out their several and respective rights by splitting up turves, and digging up small pits about those patches of wastrel lands which they intended either to work or let for the purpose of obtaining minerals. Hence we naturally infer that this ancient and universal custom, which is denominated "Bouding," and which may be easily traced from modern days up to Saxon times, originated at the time in which our ancestors assumed the occupation of tinnners. Previous to the arrival of the Phœnicians, the ancient Cornish valued their several and respective rights on the several moors and wastrel, only as it regarded their supply of fuel, and of the manure which it afforded for the little inland patches of soil which they held in cultivation; and being ignorant of framing covenants, conditions, and agreements, by way of grant, sett, or lease, they invariably resorted to the primitive and more simple method of describing and marking out their several rights by splitting up turves about their respective boundaries. But having ascertained the value of those bits of metal, which from time to time they had accidentally found among the peat ashes from the Phœnicians, they no longer confined themselves to cutting up turves merely, but dug small pits also about their respective limits, intimating that their rights were not confined to the surface only, as heretofore, but that they also extended to such an indefinite extent below the surface as they might think proper to prosecute their operations for the discovery of tin. This appears to be the nature, extent, and origin of the bounding system. A system which existed long before parchment, with its covenants, conditions, and agreements, was known to our ancestors. A system which has been recognised, acknowledged, and confirmed by innumerable Acts of Parliament, from age to age, and which continues to the present day unquestioned and unquestionable by every impartial and disinterested mind; such, at least, is the humble opinion of the author of the papers on Carn Brea.

[To be continued.]

## THE DUNSTANVILLE FUND.

The committee appointed by the resolution of the 25th of January, 1835, "To receive proposals and suggestions respecting the application of the Dunstanville Fund, and to state to the subscribers in the course of the ensuing summer their opinion as to the manner in which it may best be rendered a permanent benefit to the county," have agreed on the following report:—

Your committee feel strongly impressed with the difficulty of suggesting the adoption of any plan which shall satisfy the expectations of the county.

They are convinced that no great extent of benefit can arise at present from so limited a sum as is now applicable to the intended charity, and it is on future augmentations by donations or bequests, which they trust will be added from time to time, that they depend to render it ultimately productive of great and extensive benefits to the labouring population of the county, and honourable to the memory of one whose numberless acts of well-applied munificence justly gained him the respect and veneration of all who knew him.

It was resolved at a public meeting on the 9th of December, 1835, "That the residue of the general subscription shall be applied, together with the subscriptions received for that purpose, to the establishment of a charitable fund, to be called 'The Dunstanville Fund.'"

In conformity with this resolution, your committee have directed their attention to different plans which have been suggested; and after due consideration, have agreed to recommend that the whole of the sum applicable to the charity be invested in the public funds, in the names of trustees, together with such sums as shall be hereafter contributed, and that the interest arising therefrom be applied to the grant of annuities to persons disabled by accident, or otherwise, from gaining a livelihood.

Casualty is generally provided for at every well-regulated mine, and by the benefit societies established in many parts of the county; and all cases of serious accident are admissible at the Cornwall Infirmary. But it frequently happens that persons previously in possession of good bodily health, are suddenly deprived by a fall, a premature explosion, or other accident or calamity, of the ordinary means of gaining a subsistence. For such distressing cases there is, at present, no adequate provision, either for the labourer himself, or for the family which may have hitherto depended for support on his industry. Your committee would therefore recommend that small annuities, not exceeding 10*l.* each, be granted, under proper regulations, to persons producing certificates of good character, and to be continued only during good behaviour.

Your committee have anxiously directed their attention to the subject of assisting labourers to secure deferred annuities, either for themselves, or for any members of their families. But though they are decidedly of opinion that some plan of this description might be adopted, and would be likely to encourage habits of providence and forethought, and to lessen the sufferings and increase the comforts of the labouring classes, they are satisfied that the present funds are totally inadequate to embrace both objects, and they, therefore, recommend in preference the grant of small annuities, which will be attended with little, if any, difficulty, will produce immediate benefit, and is calculated to provide for the casualties to which the population of this county are peculiarly exposed.

Your committee, however, venture to anticipate the time when, from the improved state of the funds, the charity may be extended to this very desirable object.

When the general plan of the charity shall have been determined, there are many matters of detail into which your committee do not deem it advisable to enter at present, as they will more properly engage the attention of a committee which it will be expedient to appoint for such purpose, and with such power as the general meeting shall think fit to confer upon them.

Having expressed their deliberate opinion on the subject, which has been submitted to their consideration, they trust that whatever plan be adopted, will prove not less beneficial to the industrious classes, than honourable to the memory of him whose name will thus be handed down to posterity.

J. ROGERS,  
J. HEARLE TREMAYNE,  
WILLIAM TWEEDY,  
EDWARD COLLINS.

INDIA RUBBER.—Who would have thought, some years ago, when this curious substance was merely used to obliterate a pencil mark, that it would become in no small degree the means of raising human beings into the aerial regions? We understand the varnish which covers the new Vauxhall balloon is principally composed of caoutchouc, which, being perfectly pliable when dry, is eminently fitted for the purpose. The cord to which the grappling-iron (or anchor) is attached is also made of the same material.

OLD OAK.—A large oak in the forest of Cerisy, known under the name of the Queneuse, at a little distance to the right of the great road to St. Lo, is supposed, by comparing various dates, to be eight or nine hundred years old. In 1824 it measured thirty-six feet in circumference just above the soil, and was about fifty-five feet high. The trunk is now hollow, and will hold from fourteen to fifteen persons.

## THE QUANTITY OF GAS OBTAINABLE FROM A GIVEN WEIGHT OF COAL.

Mr. Peckston, in his valuable treatise on gas lighting, whilst writing on this branch of the subject, observes that pit coal may be divided into three classes, according to the proportions of its component parts. Such coals as are chiefly composed of bitumen are to be considered as belonging to the first class. These coals burn with a bright yellowish blaze during the whole process of combustion; they do not cake, neither do they produce clinders, but are reduced to white ashes. At the head of this class is to be placed Cannel coal; and most of the varieties of Scotch coal, as well as some of those found in Durham and Northumberland, belong to it, likewise the coals from Lancashire and the north-western coasts of England. When ellipsoidal retorts are used (which is the form which Mr. Peckston decidedly prefers), and charged with 14 bushels, or about 126 lbs. of coal, the following quantities of gas may be obtained in the manufactory, or on the large scale. From a ton of

Lancashire Cannel ..... 11,600 cubic feet of gas.  
Newcastle (Hartley's) ..... 9,600 "

Staffordshire (best kind) ..... 6,400 "

The coke obtained from coals of this class is in small quantity, and of very inferior quality. The second class of coals comprehends those varieties which cake in burning. These contain less bitumen and more charcoal than the first class. They produce less ashes, but afford hard grey cinders, which, when burnt over again with fresh coals, produce a very strong heat. The gas obtained from these coals is not of so rich a quality as that from the first class, but the coke is extremely well adapted for domestic and culinary purposes. When ellipsoidal retorts are used, charged as before, with about a bushel and a half, from a ton of

Wallsend, may be obtained ..... 10,300 cubic feet of gas.  
Temple Main ..... 8,100 "

Primrose Main ..... 6,200 "

Pembry ..... 4,200 "

The third class of coal consists of such as are chiefly composed of charcoal, chemically combined with different earths, and containing little or no bitumen. Amongst the varieties of this class are the Kilkenny coal, the Welch coal, and the stone coal. None of the coals comprised in this class can be profitably used for making gas.

Mr. Peckston gives the following table, exhibiting the comparative quantity of gas obtainable from the following different species of coals comprehended in the first and second classes, the Scotch Cannel coal being considered the standard, and estimated at 1000:—

Scotch Cannel	1000	Pontop	760
Lancashire ditto	986	Temple Main	690
Yorkshire ditto	949	Manor Wallsend	650
Bewick and Craster's Wallsend	875	Forest of Dean—Middle Delf	613
Russell's ditto	861	Eden Main	563
Tanfield Moor	850	Staffordshire coal, 1st kind	546
Heaton Main	822	Ditto ditto 2d ditto	514
Hartley's	810	Ditto ditto 3d ditto	498
Killingworth Main	792	Ditto ditto 4th ditto	490
		Pembry	354

With respect to the best form of retorts, and the mode of working them, so as to produce the largest quantity of gas, we give the following summary of three sets of experiments detailed in Mr. Peckston's work; the coals in each instance were of the same quality. 103 chaldron 12 bushels, distilled in circular retorts, charged with 2 bushels of coals, and each charge worked off in 6 hours, afforded 8300 cubic feet of gas per chaldron, and required 43 chaldron 14 bushels of coals for heating the retorts, = 42 per cent. on the quantity employed for making gas. By cylindrical retorts charged with 2 bushels at each charge, and which was worked off in eight hours, 85 chaldron 27 bushels of coals yielded 10,000 cubic feet of gas per chaldron, and required for carbonization or heating of the retorts 21 chaldron 16 bushels of coals, or about 25 per cent. of the quantity carbonized. With ellipsoidal retorts, the two diameters of which were 20 inches and 10 inches respectively, charged with 14 bushel, and each charge worked off in 10 hours, 61 chaldron 8 bushels of coals yielded 14,000 cubic feet of gas per chaldron, and required for carbonization 19 chaldron 27 bushels of coals, or 32 per cent. of the quantity carbonized. Mr. Peckston likewise states that five ellipsoidal retorts are capable of carbonizing 45 bushels, or 33 cwt. of coals, in 24 hours, but their average work may be taken at 1 chaldron, or 27 cwt. in that time.

Mr. Anderson, of Perth, made a great number of experiments, to determine the comparative quantity of light afforded by candles and coal gas; the size of the candles which he employed was short sixes. The following are some of the results:—

A 3-jet burner consumed per hour	2074 cub. in.	= 6 candles.
An Argand of 5 holes	2592 "	" 8 "
Ditto 10 "	3798 "	" 12 "
Ditto 14 "	5040 "	" 19½ "
Ditto 18 "	6840 "	" 21 "

The mean of these results is, that 324 cubic inches of coal gas yield light equal to that of one candle for an hour; but this is the coal gas of Perth, the specific gravity of which, Mr. Anderson says, is 650.—*Heber's Engineer's and Mechanic's Encyclopedia.*

EFFECTS OF LIGHTNING ON VEGETATION.—M. Barie, of La Haye, has communicated to the French Academy of Sciences, the remarkable growth of a poplar which had been struck by lightning. It grew in an avenue belonging to him. The lightning broke some of the branches at the top, and the fluid ran along the trunk from the top to the bottom of the northern side, without injuring the bark, went into the ground at the root, and turned up two large masses, each nearly a cubic foot in size. The tree at that time measured twelve inches in circumference, and it was in the month of July that the circumstance occurred. In the following April the trunk had exactly doubled its size, while the trees close to it retained the same girth; and the sap flowed in such abundance as to force its way through the bark.

CARBONIC ACID.—Dr. Dalton, who has for years turned his attention to the amount of carbonic acid in the atmosphere, says that he has satisfied himself that its average quantity is one part in 1000. He is also of opinion that the quantity of this gas in the atmosphere is constantly the same in town and country, and that even in a crowded theatre it seldom rises to one per cent.

CHLORIDE OF LIME.—Chloride of lime is stated to be an effectual remedy against the bites of snakes, stings of wasps, &c.; and all persons frequenting the moors are advised to provide themselves with a bottle of it.

COAL.—Some proprietors of land at Stock and Bradley are, we understand, about to bore for coal, two respectable miners from Staffordshire having given it as their positive opinions, that a strong bed of that invaluable article exists in that neighbourhood.—*Birmingham Advertiser.*

SALE OF FOSSILS, &c., AT BAKKELL.—The sale by auction of fossils and mineral specimens, &c., belonging to the late Mr. White Watson, took place lately in the Town-hall, Bakkell. A variety of old books, manuscripts, pictures, sketches, organic remains from the coal district, and a large collection of old coins, sold very low. The specimens of fossils, which were numerous and choice, also tablets of Derbyshire stone, and of various sections of the strata in the town and neighbourhood of Bakkell, with duplicates, &c., fetched high prices. The cabinet of 3000 specimens, with case of drawers, and scientific description thereto belonging, sold for 25*l.*

SILKWORKS.—It is calculated that 127,000,000 of silkworms may have toiled through their short lives to produce the quantity of silk contained in the new Vauxhall balloon.

INSECTS.—Dr. Imhoff, in a work presented to the Society of Natural History, at Bale, has estimated the number of insects now known at 560,000 species, Germany alone containing 14,000.—*Athenæum.*

GREATEST ASCENTS IN THE ATMOSPHERE.—M. Bousingault, in company with Colonel Hall, on the 15th of December, 1831, ascended Chimborazo, to the height of 6006 meters (19,699 feet), the greatest elevation which has been attained on land. Humboldt having been able to reach as high only as 19,400 feet. M. Gay Lussac, in a balloon, rose to 22,900 feet at Paris. The barometer carried by M. Bousingault fell to 13 inches 8 lines. The temperature in the shade was 7-8 C. (45.60 F). This chemist thinks it possible to live in rarified air. Thus, at a height almost equal to that of Mont Blanc, where Saussure had scarce strength to consult his instruments, young women may be seen in South America dancing the whole night. The celebrated battle of Pinchinas, during the war of independence, was fought at a height little inferior to that of Mount Rose. The guides who accompanied Saussure assured him that they had seen the stars in broad day. Bousingault never witnessed them, although he reached a much greater altitude.—*Jour. de Chim. Médic.*

DEMAILLÉ.—Demaillé conceived the globe to have been covered with water for many thousand years; that it gradually retired; that all the terrestrial animals were originally inhabitants of the sea; that man himself began his career as a fish.

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